

INDUSTRY RESEARCH & INNOVATION PROJECTS

AUDREY COPELAND

*27th Annual Fall Asphalt Conference
Richmond, Virginia
October 7th, 2014*



NATIONAL ASPHALT
PAVEMENT ASSOCIATION



Let's Talk About...

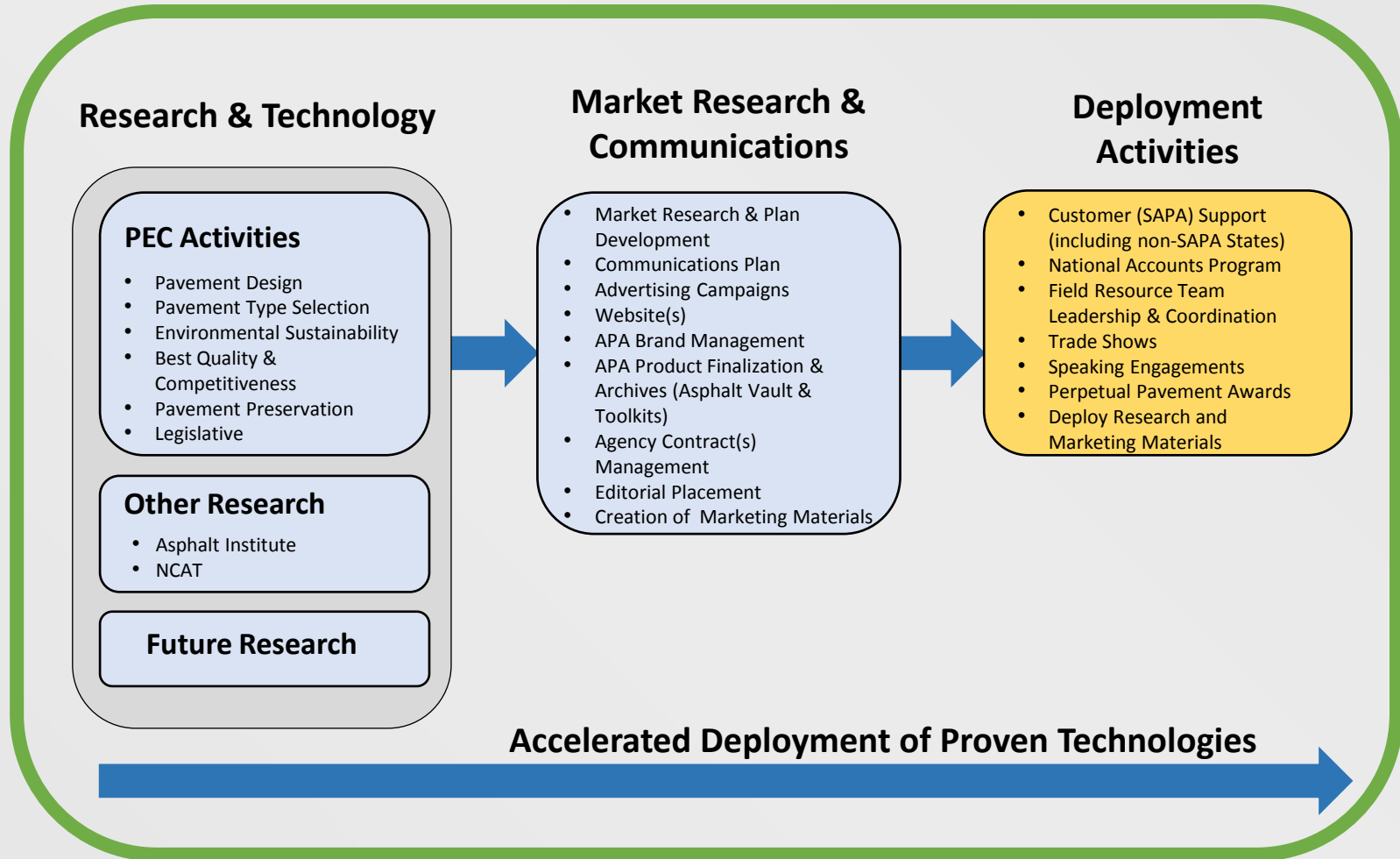
What our customers want

Research projects and implementation

**A partnership for innovation in asphalt
pavements**



Built Upon Science





A Survey of Pavement Officials And the Driving Public

What Do Our Customers Want?



The APA is a partnership of the Asphalt Institute, National Asphalt Pavement Association and the State Asphalt Pavement Associations.



Survey Participants



SURVEY



WHO

**Driver Preference
Survey**

**US Drivers,
18+**

**Regional
Oversamples**

Trucker Oversample

Driver Survey

**US Drivers, 18+ who drive
50+ miles per week**

**In-Depth Interviews
DOT's, Public Works**

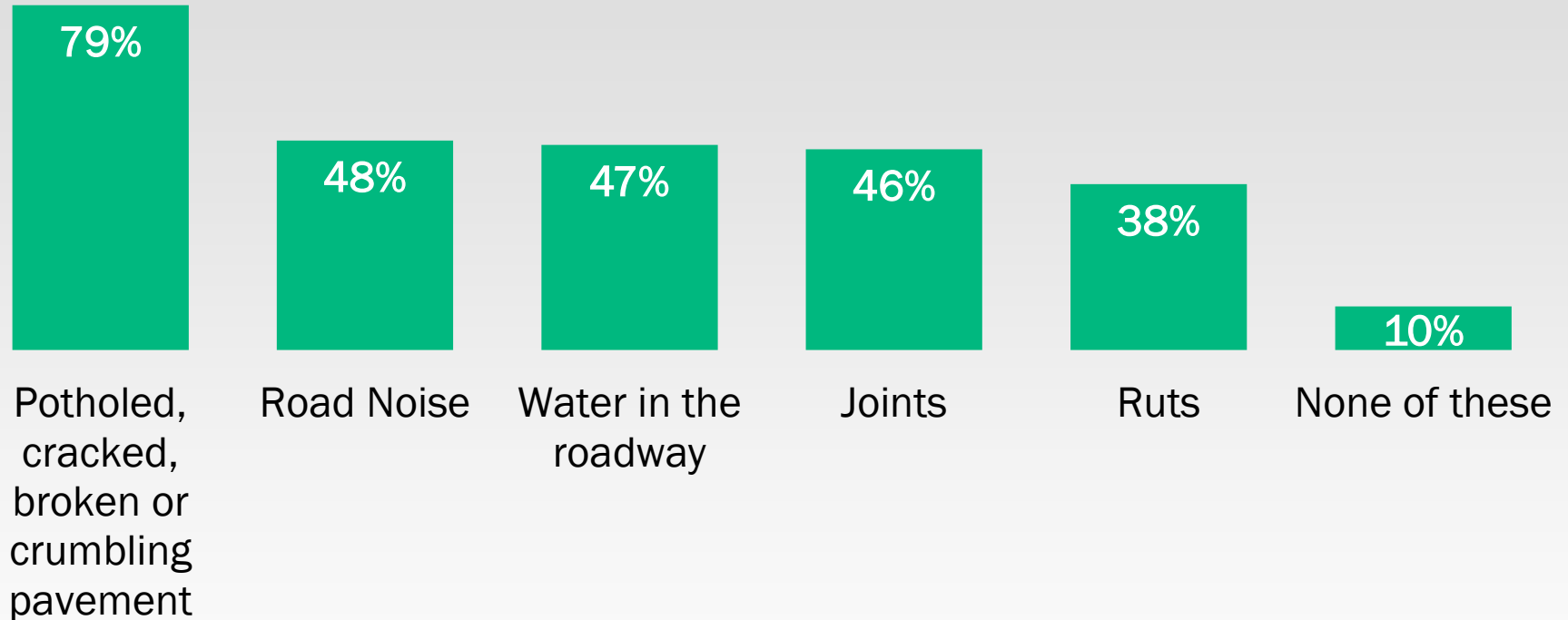
**Appointed Officials, Engineers,
Architects, Developers, Owners
and Concessionaries, and Other
Key Stakeholders**

**Survey
DOT's, Public Works**

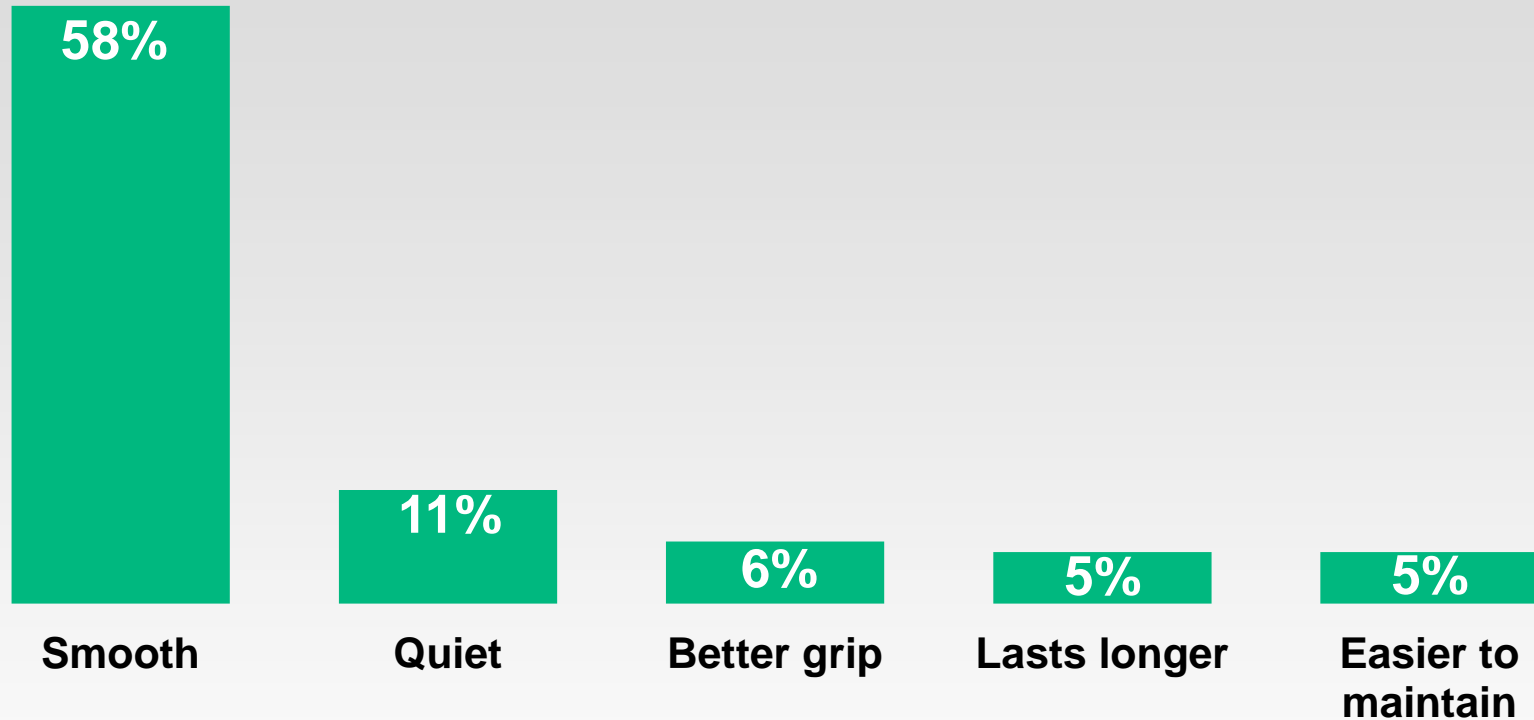
WHAT MATTERS TO DRIVERS?



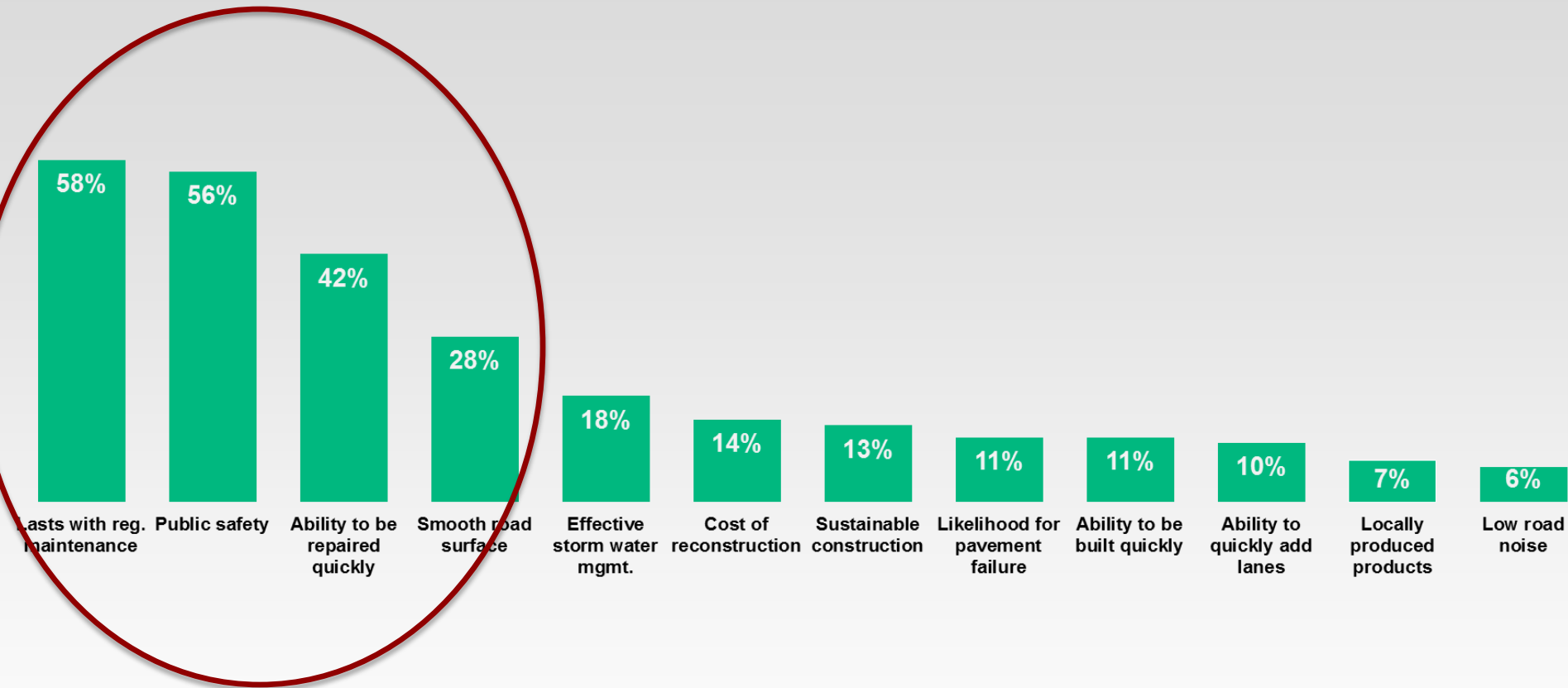
Common Roadway Issues Experienced in the Past Year



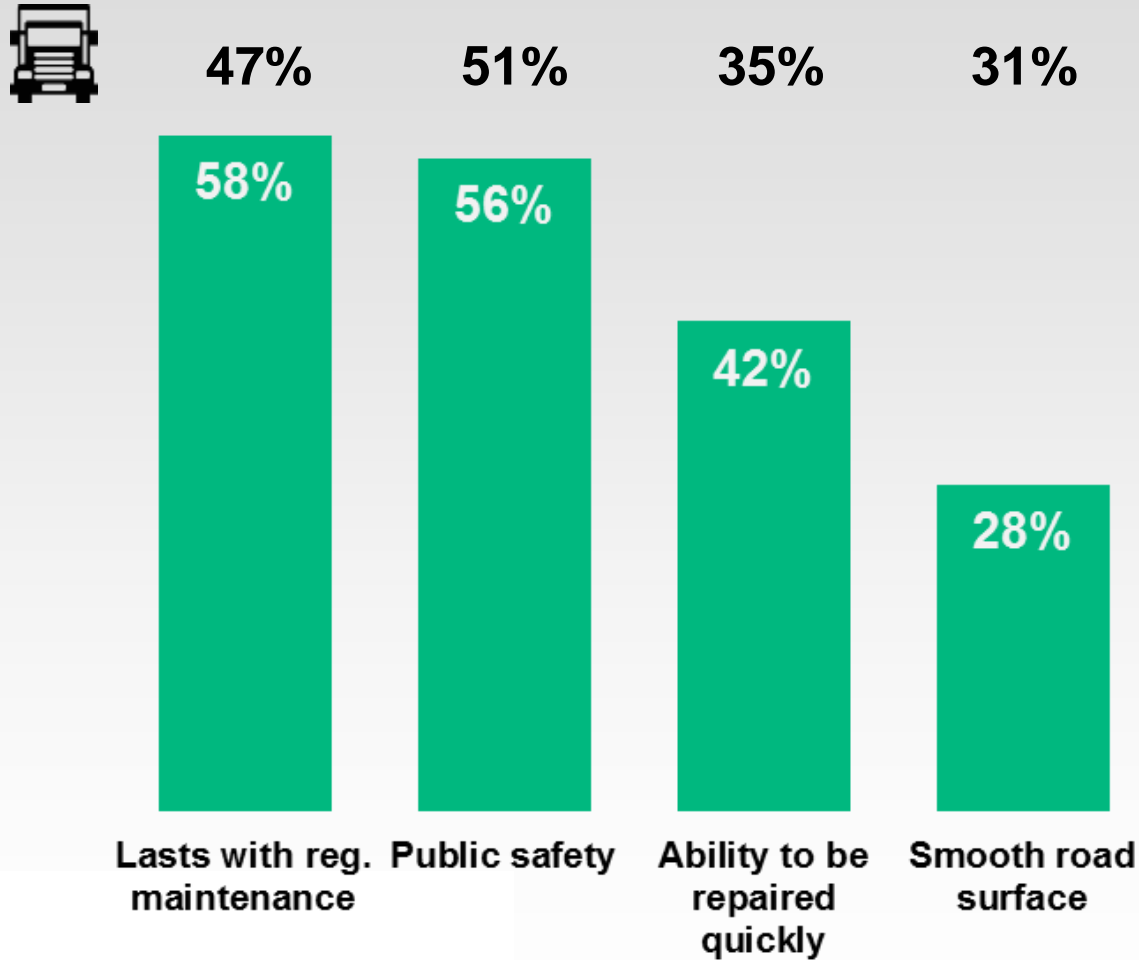
Drivers – Satisfaction Indicators



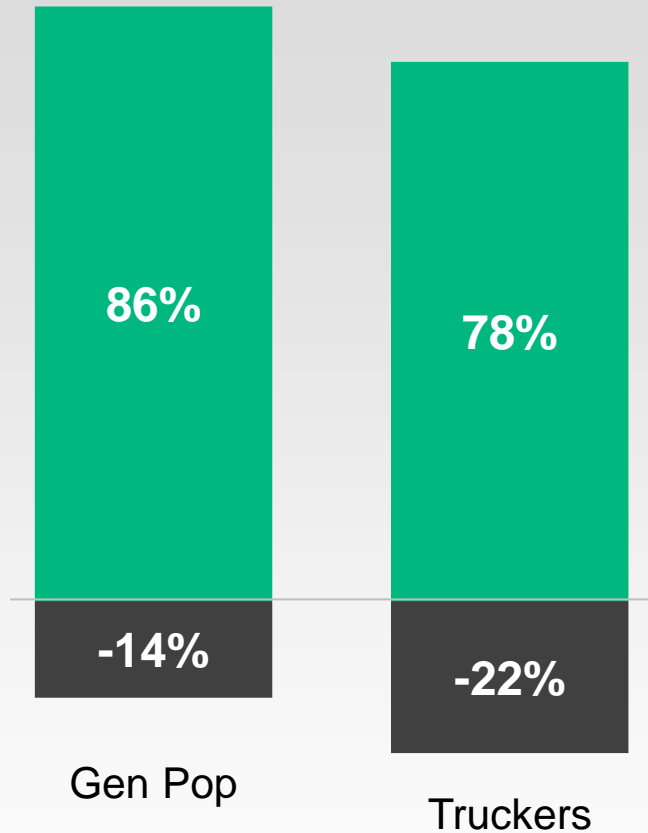
Priorities When Building/Rebuilding Roads



Priorities When Building/Rebuilding Roads



Roadway Spending Priorities



1. PERFORMING MAINTENANCE & REPAIRS

Gen Pop: 79% most important

Truckers: 68% most important

2. INCREASING CAPACITY

Gen Pop: 63% second most important

Truckers: 56% second most important

3. BUILDING NEW ROADS

Gen Pop: 68% least important

Truckers: 56% least important

■ Maintaining Existing Roads ■ Building New Roads

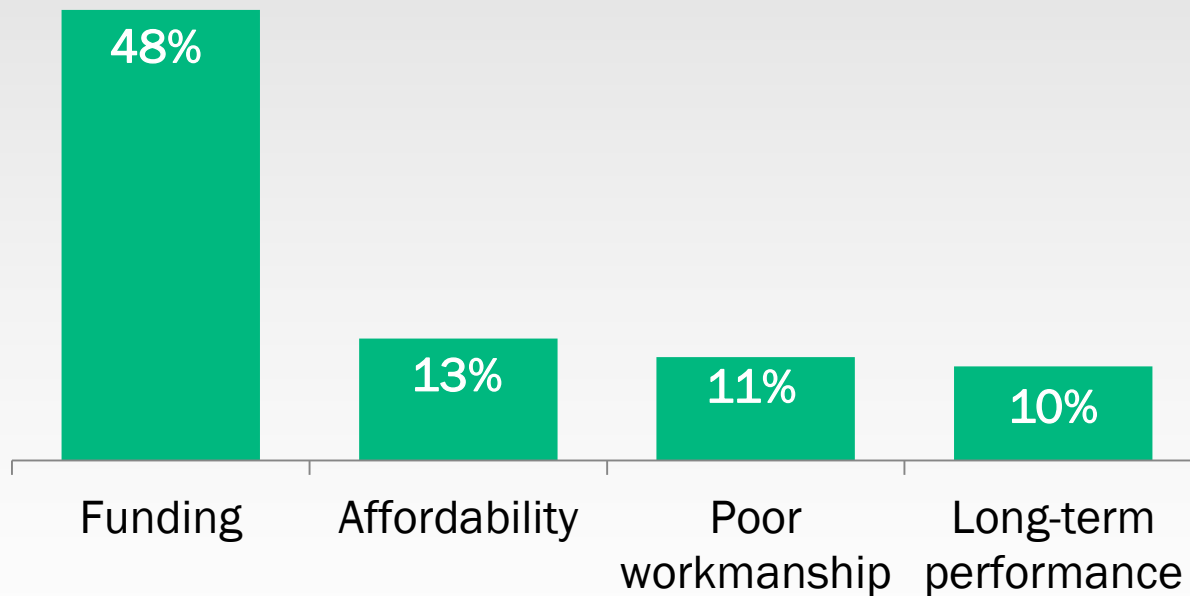
WHAT MATTERS TO DECISION MAKERS?



Key Findings – In-Depth Interviews

- Shrinking infrastructure funding.
- Pavement innovation is key to reducing costs.
- Speed of construction was a primary asphalt differentiator.
- Pavement decision makers have positive perceptions of asphalt pavement industry.
- Agencies take into account driver and stakeholder opinions.

Challenges to Meeting Priorities

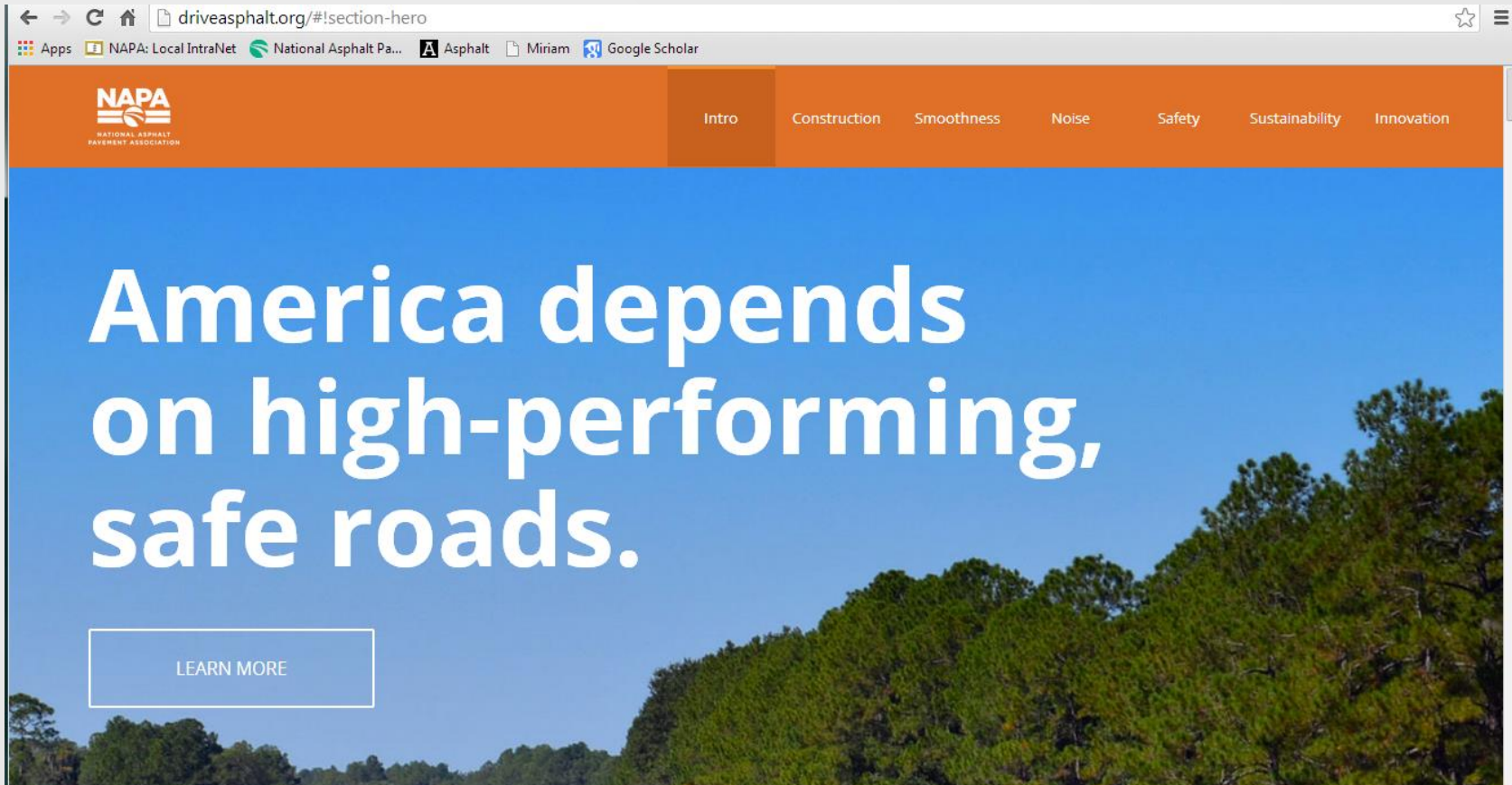


Our Customers Want

- Durable, Long-Lasting pavements.
- Reduced Costs Through Pavement Innovations.
- A Smooth, Quiet and Safe Pavement that can be Maintained.
- To Minimize Construction-Related Delays.
- Funding for Maintenance and Capacity Expansion.



Driveasphalt.org





Asphalt Industry's Investment

Six NAPA–SAPA Task Groups



Best Quality &
Competitiveness



Environmental
Sustainability



Legislative



Pavement
Design



Pavement
Preservation



Pavement
Type
Selection



LCCA Issues in Washington

- **MAP-21**
 - **Mandate LCCA, Alternative Bid, and MEPDG**
- **Financial Services Appropriations Bill**
 - **Mandate Material-Specific Discount Rates**
- **Water Resources Development Act**
 - **Mandate LCCA on Corps Projects**
- **MAP-21 Reauthorization**
 - **LCCA on all Federal-Aid Highway Projects**
- **Ready Mixed Concrete Check-Off**

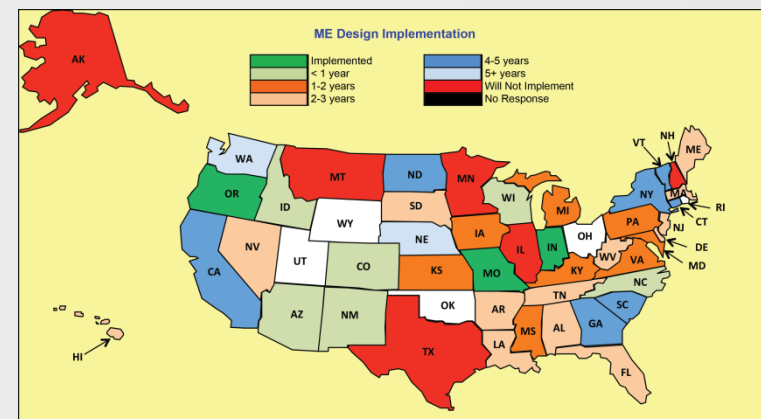
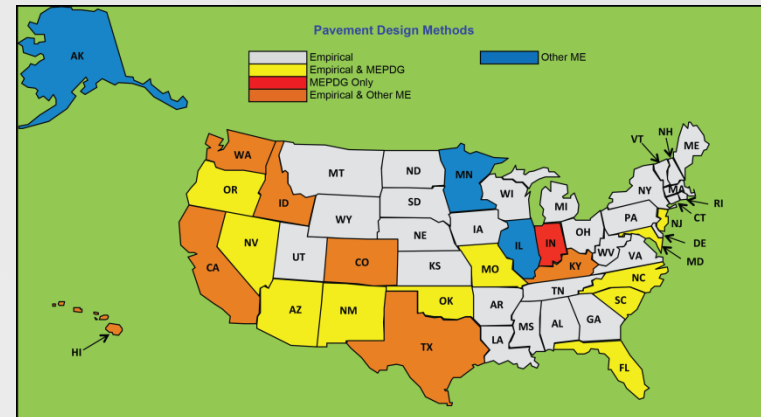


Legislative



Pavement Type Selection & Pavement Design Deliverables

- Optimized Pavement Design & Materials Selection
- Determining Service Life based on Comparable IRI Values
- www.ncat.us





Road Construction Updates

Donec id elit non mi porta gravida at eget metus. Fusce dapibus, tellus ac cursus commodo.

Introduction

The rePave Scoping Tool and accompanying resources located here are the products of the SHRP 2 R23 study to develop Guidelines for Long Life Pavement Renewal. The study, Scoping Tool, and accompanying resources focus on long life options (30-50 years), not pavement preservation activities.

Resources

Click on the button below to access the wealth of content and resource aids that were developed as a result of this study. This includes a Pavement Assessment Manual, Best Practices for both Rigid and Flexible Pavement Construction and Guide Specifications.

[View Resources](#)



AMERICA RIDES ON US

Asphalt.

1 Project Information

Project Information

2 Design Parameters

Design Parameters

3 Pavement Surface

Pavement Surface

4 Pavement Structure

Pavement Structure

5 Equation Results

Equation Results

Pavement Surface (Asphalt)

Layer Coefficient (a): [i](#)

Drainage Coefficient (m): [i](#)

Minimum Thickness: in. [i](#)

Surface

Structure

Base



Pavement Design

Next webinar is Thursday, October 16th at 2:30 PM EST
The webinar is free and PDHs are available.



AMERICA RIDES ON US

Asphalt.





Sustainable Asphalt Technologies

Porous Asphalt



Reclaimed Asphalt Pavement (RAP)



Ground Tire Rubber (GTR)

Warm Mix Asphalt (WMA)



Recycled Asphalt Shingles (RAS)

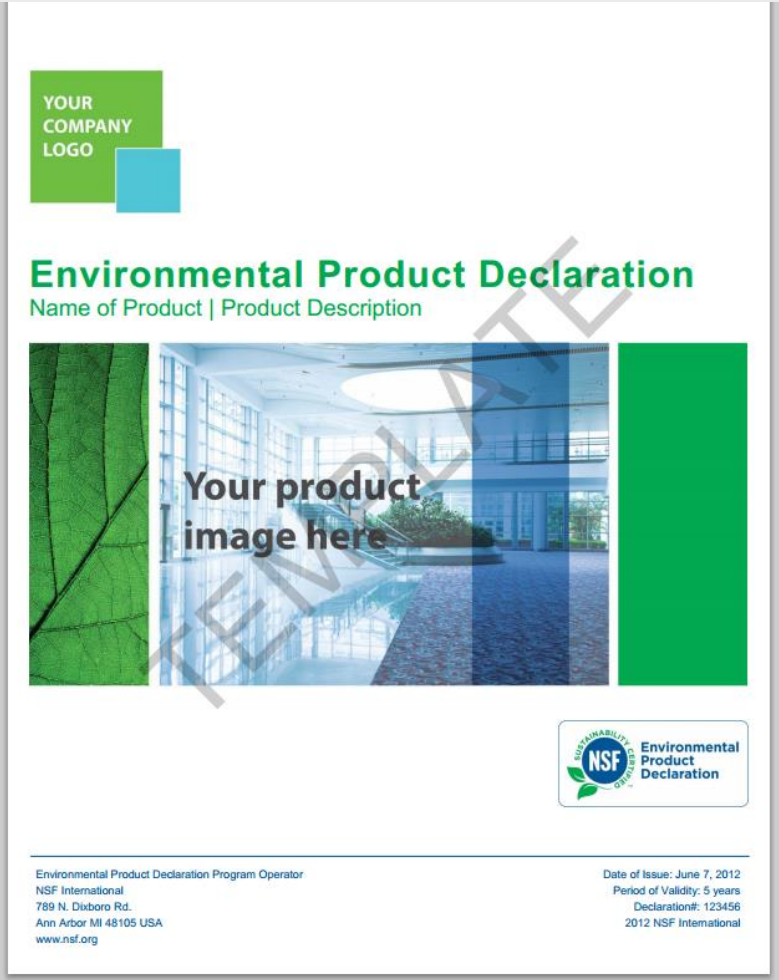


Perpetual Asphalt Pavement





Environmental Product Declarations



Environmental Facts

Functional unit: 1 metric ton of asphalt concrete

Primary Energy Demand [MJ]	3.9x10 ³
Renewable [MJ]	3.9x10 ³
Non-Renewable [MJ]	3.5x10 ²
Global Warming Potential [kg CO ₂ -eq]	79
Acidification Potential [kg SO ₂ -eq]	0.23
Eutrophication Potential [kg N-eq]	0.012
Ozone Depletion Potential [kg CFC-11-eq]	7.3x10 ⁻⁹
Smog Potential [kg O ₃ -eq]	4.4

Boundaries: Cradle-to-Gate
Company: XYZ Asphalt
RAP: 10%

Source: PE International, Values are for illustration purposes only.

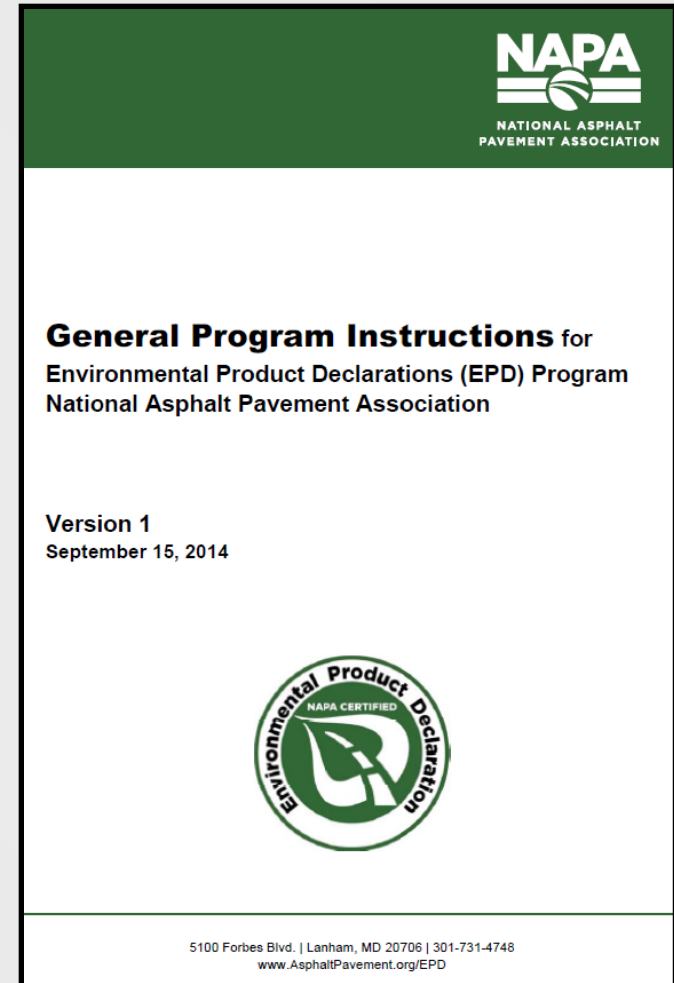


Asphalt Industry EPD Program



Learn more about:

- Program Goals and Objectives
- Product Category Rules
- PCRs Under Development by NAPA/SAPAs
 - Asphalt Mixtures



PVI & MIT Review

- Coming soon: Review of *Model-Based Pavement-Vehicle Interaction Simulation for Life Cycle Assessment of Pavements* from a Pavement Design Perspective
- NAPA Webinar: Where the Rubber Hits the Road: PVI Re-examined

EFFECTS OF PAVEMENT PROPERTIES ON VEHICULAR ROLLING RESISTANCE: A LITERATURE REVIEW

By
J. Richard Willis, Ph.D.
Mary M. Robbins, Ph.D.
Marshall Thompson, Ph.D.

July 2014



IRI Database for Smoothness & Emissions

Life Cycle Solutions

By Section

By Network

Custom Query

Emissions Estimator

Performance Overview

Explore Pavement IRI Performance

Welcome to IRI Explorer

Login

Emissions Estimator

The Project Emission Estimator (PE2) will have the capability of benchmarking life cycle emission estimates associated with construction maintenance and use of the roadway. This page outlines the steps taken to illustrate the concept of a pavement life cycle along with the inputs needed to create one in PE2.

Calculator

General Information

Generalized Roadway Speed:
☒ 55mph ☐ 70mph

Average Daily Traffic (ADT):

Project Length (in miles):

Number of Lanes:

Build Life Cycle

Instructions

1. Define the first intervention strategy

This will define the initial construction (materials, batch plant, and hauling/construction equipment) and work zone emissions in year 1.

currently, choices limited to any one of the reconstruction, rehabilitation, or maintenance projects investigated by researchers at michigan technological university (mtu).

duration days of the project will also be defined to estimate relative work zone traffic emissions.

2. Define the second intervention strategy (intervention year)

repeat step two, until preservation strategy is achieved and end-of-life has been attained.

use phase will be measured yearly throughout the life cycle and quantified in the life cycle emission report.

Job:

M1

Job Type:

HMA Cold Milling and Overlay

Intervention Year:

Project Duration:

Add Intervention

Year	Job Type	Type	Emissions per Lanemile	Project Duration Days
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Output

Annualized Emissions

0

CO2 Emissions

Emissions

Year

Total CO2 Emissions

Highcharts.com

NAT PAVEN

Environmental Sustainability

27

Reflective Pavements and Urban Heat Island

Do reflective pavement mandates make sense?

Legislative efforts to mandate reflective pavements have been introduced in some areas, but the scientific evidence doesn't clearly support the use of reflective pavements to address the urban heat island effect. While these pavements do redirect some energy from a pavement's surface, much of it ends up interacting with buildings, pedestrians, and cars — leading to potential unintended negative consequences.

ROOFS

MOST OF THE SCIENCE SURROUNDING REFLECTIVITY AND UHI FOCUSES ON ROOFS, WHICH ARE AT THE TOP OF THE URBAN ENVIRONMENT. PAVEMENTS ARE NOT ROOFS.

Unintended Consequences

A Research Synthesis Examining the Use of Reflective Pavements to Mitigate the Urban Heat Island Effect

by Jiachuan Yang; Zhihua Wang, Ph.D.; and Kamil E. Kaloush, Ph.D., P.E.
Arizona State University National Center of Excellence for SMART Innovations

REFLECTIVE CONCRETE PAVEMENTS MIGHT NOT WORK AS CLAIMED TO

SURFACE TEMPS

DIFFERENCES IN SURFACE TEMPERATURES HAVE MINIMAL BEARING

SUMMER

REFLECTED RADIATION CAN INCREASE COOLING LOADS FOR SURROUNDING BUILDINGS IN THE SUMMER.

WINTER

LIGHT-COLORED PAVEMENTS REQUIRE MORE DEICING CHEMICALS IN WINTER TO CONTROL SNOW AND ICE.



Environmental
Sustainability



October 2013



Best Quality and Competitiveness Deliverables

- High Binder Replacement for Recycled Materials
 - Draft Synthesis
 - Webinar: Improved Sustainability & Performance with High RAP and RAS Usage
- Education and Training Program
 - LCCA and Innovative Technologies





Pavement Preservation

THINLAY

SAFE. SMOOTH. DURABLE.

POSITION PAPER



NATIONAL ASPHALT PAVEMENT ASSOCIATION

5100 Forbes Boulevard, Lanham, MD USA 20706-4407

TF: 888.468.6499 PH: 301.731.4748 FX: 301.731.4621

www.asphaltpavement.org

Thinlays: The Pavement Preservation Tool of Choice
NAPA Position on Thin Asphalt Overlays for Pavement Preservation

<http://www.asphaltpavement.org/ThinIsIn>

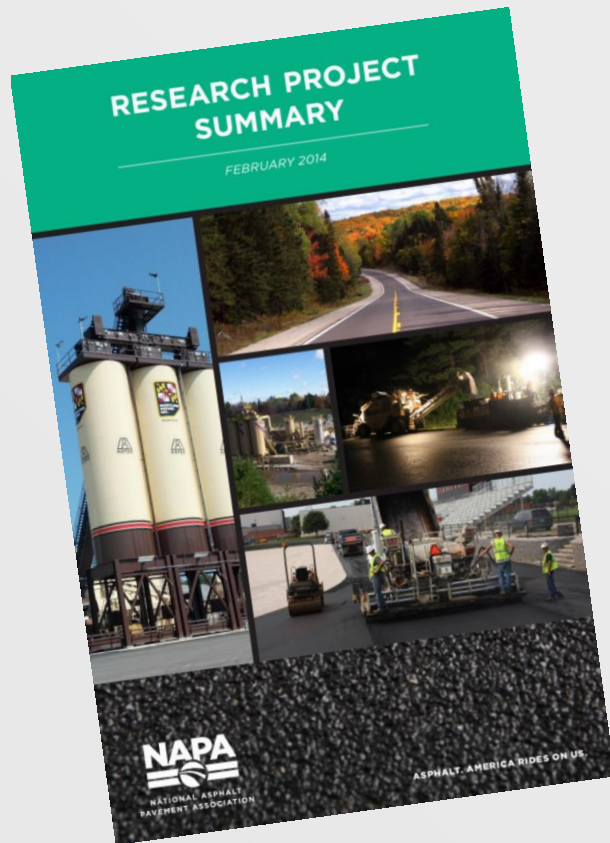


Pavement
Preservation





PEC Projects Summary



Other PEC Projects

- Develop Thinlays with High Recycled Content
- Asphalt's Speed of Construction for Cost Effectiveness

Download a copy: <http://goaspha.lt/1grtLlj>



FHWA/Industry Partnership

- \$2.5 million Cooperative Agreement for the *Advancement of Innovative Asphalt Technologies*
- Partnership provides a mechanism to advance implementation of innovations
- Agreement is for 5 years, FY 2014–2018



Deliverables

- FY2014–15 Deliverables Include
 - Recycled Materials & WMA Survey (2013)
 - RAP Management Best Practices
 - Recycled Tire Rubber Best Practices
 - High Binder Replacement Mixtures Synthesis
 - Pavement Economics & LCCA Webinar



COMING UP!

PaveXpress: A Simplified,
Online Pavement Design Tool
October 16th at 2:30 PM EDT

Available Online:

- LCCA for Pavements
- What, How, and Why of EPDs
- Porous Asphalt Pavement
- Thinlays for Pavement Preservation
- Sustainability 101:
The What, Why, And How
of Sustainability for the
Asphalt Industry

The Brightest
Ideas
for a Sustainable
Future



Asphalt Sustainability Conference

November 4-5, 2014 • Omni Royal Orleans, New Orleans, LA
www.asphaltpavement.org



JUST ADDED:
Tour the New Orleans Lager
& Ale Brewing Co.
- a Sustainable Brewery!

THANK YOU

asphaltpavement.org



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audrey@asphaltpavement.org



[@AudreyRCopeland](https://twitter.com/AudreyRCopeland)



What do we value?

- **Decision Makers**
 - Cost over life-cycle
 - Performance
 - Long-life – quality of ride over life
- **Driver Perception Survey**
 - Smooth, Safe, Quiet
 - Service
 - Well-maintained
 - Delays & construction timing
 - Quality of drive



2013 Industry Survey Results - Preliminary

- Total Estimated Tonnage: 351 million
- Tons of RAP Used in Asphalt Mixtures: 68 million
- National Average RAP Use: 20%
- Tons of RAS Used in Asphalt Mixtures: 2.3 million
- Tons of WMA: 106 million
 - Chemical Additive: 12%
 - Plant Foaming: 87%



THE BIG THINGS - NOW

- PAVEMENT TYPE SELECTION
- PAVEMENT DESIGN & MATERIALS
- SUSTAINABLE PAVEMENTS
- PRESERVATION